How to Make Thermite

Co-authored by **Bess Ruff, MA**

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Thermite is a material used in welding to melt metals together. It's a mixture of metallic aluminum and iron oxide (ferric oxide), which produces molten iron after a redox reaction. When the aluminum and oxygen in the mixture combine, the thermite will ignite, generating high temperatures.[1] It burns at around 2,200 °C (3,990 °F) and can melt through most metals. You can make it yourself, but you first need to take safety precautions because thermite is very dangerous. Then, you can make the thermite for use in welding or as an experiment.

Part 1 Take Safety Precautions

1 **Select your site carefully.** Make sure there is nothing that can burn within a 4 meter (13.1 ft) radius of the reaction. Check that metals with low melting points, such as lead, tin, cadmium, or zinc, aren't near your 4 meter (13.1 ft) radius, as well.

- If you are working in a science lab, it's safe to do this indoors as long as you take precautions. Wear protective gear and engage the lab's heat screens.
- Do not do this inside your home. It's best to do this outside. Once you're experienced in working with thermite, you may be able to do it in a garage or industrial space.
- Clear your area of dry brush and other flammable items.
- It's best to use a heat resistant mat, if you can.[2]

2 **Use ceramic containers rather than metals to minimize fire risk.** Since you'll be burning metals, the thermite fire can burn through a lot of substances, including thick metals. Ceramics, such as clay ware, can hold the fire without melting.[3]

- Clay flower pots are a great option.
- Look online for ceramics labeled as having a high heat point. Remember, thermite burns at 2,200 °C (3,990 °F).

3 **Wear a welding mask for complete protection.** In addition to being extremely hot, thermite emits UV radiation that can damage your eyes if not dealt with properly. A welding mask provides the best protection because it's designed for use with burning metals, such as thermite.[4]

- Do not look into the flame directly, use welder's glasses. Looking at the flame directly could cause permanent eye damage.
- If you don't have a welding mask, you can wear a pair of dark sunglasses with full UV protection. However, the thermite can still damage your eyes if you look at it directly.

4 **Apply your safety gear, including gloves and a fireproof apron.** Wear a pair of sturdy, heatproof gloves, and cover your body with a fireproof apron. As a precaution, wear thick sleeves and pants to cover your exposed skin. Also, wear a pair of close-toed shoes.[5]

- Thermite is very dangerous, so protective gear is essential.

Part 2 Make the Thermite

1 **Obtain finely powdered iron oxide (rust), aluminum powder, and a thin strip of magnesium.** The iron oxide and aluminum will react to form thermite, while the magnesium will serve as the ignition material. For a basic thermite experiment, you'll need 3 grams of aluminum powder and 9 grams of iron oxide.

- Do not try to grind up the metals into powder yourself, as this is dangerous. Buy them in jars from a chemical company or online. Additionally, you can find aluminum powder in a paint store or in an Etch-a-Sketch.
- If you don't want to use magnesium strips to ignite the materials, you can also use a combination of potassium permanganate and glycerin, both of which can be obtained in retail stores and online.

Part 2

Make the Thermite

2 **Dry out your iron oxide in an oven or Bunsen burner before starting.** Set the oven on a medium temperature, such as around 200 °F (93 °C). Heat the iron oxide for 1 hour. If you're using a Bunsen burner, place the iron on an evaporating dish over the flame for 1 hour.[6]

- Allow the iron oxide to completely cool before you do the experiment.

3 **Mix the aluminum powder and iron oxide on a sheet of paper.** Add 3 grams of aluminum powder and 9 grams of iron oxide. You can swirl the metals together or shake them between 1 piece of paper and another. Continue to blend until they are fully mixed together.

- You can increase the quantity of metals, as long as you stick to a 1:3 ratio of aluminum to iron oxide. However, you should not increase the amount of metal until you are experienced in working with thermite, as it is very dangerous.
- Never mix them in a metal container, as this can contaminate the project or cause an unwanted reaction.[7]

4 **Pour the mixture into a ceramic container.** You can use a dish or clay flower pot. Ceramics are less likely to melt with the heat of the thermite. It's best to place the ceramic container into a second ceramic container, in case the first 1 shatters from the heat.[8]

- Lighting thermite on an ice block is highly discouraged, as it may cause a dangerous explosion. Ice is not an option for controlling the heat of the flame.

5 **Insert the magnesium strip, which you'll use to light it.** Make sure that your magnesium strip is long enough to provide you with the time necessary to get away.[9]

- If you're using potassium permanganate and glycerin, put a fairly good size pile of potassium permanganate on the thermite, then drip glycerin onto the potassium permanganate. That is not very reliable so it's best to use a magnesium strip.

6 **Light the magnesium strip from a safe distance.** It's best to use a long lighter or a stick like the ones used to light fireworks. Back away from the thermite to watch the reaction from a safe distance.

- You can also use a sparkler to light the thermite.
- Keep your safety gear, especially your eye protection, on at all times.

7 **Do not try to extinguish a thermite reaction using water.** You'll have to let the thermite burn out. Otherwise, use copious amounts of dry sand to extinguish the fire.[10]

- A thermite reaction is irreversible once it starts.